EXECUTIVE SUMMARY

Biopower (biomass-to-electricity generation), a proven electricity generating option in the United States and with about 11 GW of installed capacity, is the single largest source of non-hydro renewable electricity. This 11 GW of capacity encompasses about 7.5 GW of forest product industry and agricultural industry residues, about 3.0 GW of municipal solid waste-based generating capacity and 0.5 GW of other capacity such as landfill gas based production. The electricity production from biomass is being used and is expected to continue to be used as base load power in the existing electrical distribution system.

An overview of sector barriers to biopower technology development is examined in Chapter 2. The discussion begins with an analysis of technology barriers that must be overcome to achieve successful technology pathways leading to the commercialization of biomass conversion and feedstock technologies. Next, an examination of institutional barriers is presented which encompasses the underlying policies, regulations, market development, and education needed to ensure the success of biopower.

Chapter 3 summarizes biomass feedstock resources, characteristics, availability, delivered prices, requirements for processing, and the impediments and barriers to procurement.

A discussion of lessons learned includes information on the California biomass energy industry, lessons from commercial biopower plants, lessons from selected DOE demonstration projects, and a short summary of the issues considered most critical for commercial success is presented in Chapter 4.

A series of case studies, Chapter 5, have been performed on the three conversion routes for Combined Heat and Power (CHP) applications of biomass—direct combustion, gasification, and cofiring. The studies are based on technology characterizations developed by NREL and EPRI. Variables investigated include plant size and feed cost, and both cost of electricity and cost of steam are estimated using a discounted cash flow analysis. The economic basis for cost estimates is given.

Environmental considerations are discussed in Chapter 6. Two primary issues that could create a tremendous opportunity for biomass are global warming and the implementation of Phase II of Title IV of the Clean Air Act Amendment of 1990 (CAAA). The environmental benefits of biomass technologies are among its greatest assets. Global warming is gaining greater salience in the scientific community and among the general population. Biomass use can play an essential role in reducing greenhouse gases, thus reducing the impact on the atmosphere. Cofiring biomass and fossil fuels and the use of integrated biomass gasification combined cycle systems can be an effective strategy for electric utilities to reduce their emissions of greenhouse gases.

The final chapter reviews pertinent Federal government policies. U.S. government policies are used to advance energy strategies such as energy security and environmental quality. Many of the benefits of renewable energy are not captured in the traditional marketplace economics. Government policies are a means of converting non-economic benefits to an economic basis, often referred to as “internalizing” of “externalities.” This may be accomplished by supporting the research, development, and demonstration of new technologies that are not funded by industry because of projected high costs or long development time lines.